PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
(Case No. 98,766)
(NAL Case No. NAL-018)

In re Application of:
Jianzhong Jiao
Matthew Lekson

Serial No.: 09/513,040

Filed: February 25, 2000

For: TUBULAR LIGHT SOURCE REFLECTOR AND LIGHTING DEVICE

Group Art Unit: 2875

Examiner: Choi, Jacob Y.

Confirmation No. 7630

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION PURSUANT TO 37 C.F.R. § 1.131

Dear Sir:

We, Jianzhong Jiao, residing at 23161 Mystic Forest Drive, Novi, Michigan, 48375, and Matthew A. Lekson, residing at 16720 126th Pl NE, Woodinville WA, 98072, hereby declare:

1. We are the named inventors on United States Patent Application Serial No. 09/513,040, filed on February 25, 2000.

2. The invention disclosed in the above-captioned patent application was conceived and reduced to practice prior to April 16, 1998.

3. Accompanying this Declaration is an Appendix containing a photocopy of pages of our laboratory notebooks and design documentation illustrating a reduction to practice of our invention.

4. The invention was conceived and reduced to practice in the United States.

5. The date has been redacted from these photocopies; however the date is before April 16, 1998, the earliest possible filing date of any of the subject matter disclosed in United States Patent Number 6,155,694.

6. We hereby declare further that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 2-20-2004 Signed: _____
Jianzhong Jiao

Date: _____ Signed: _____
Matthew A. Lekson

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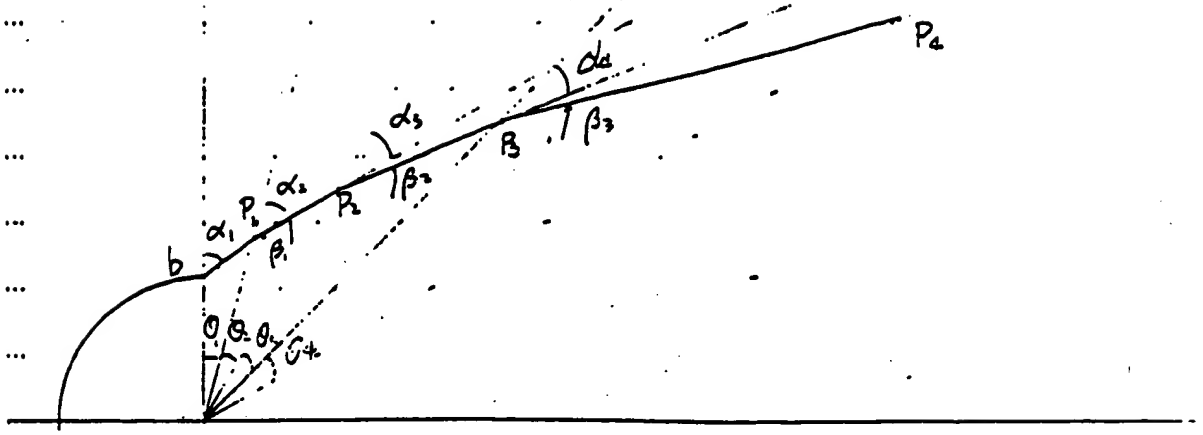
Date: _____ Signed: _____
Jianzhong Jiao

Date: 2/20/2004 Signed: Matthew A Lekson
Matthew A. Lekson

APPENDIX of DECLARATION PURSUANT TO 37 C.F.R. § 1.131

Case 1, 5°



where $P_1 = (x_1, y_1)$

$P_2 = (x_2, y_2)$

$$y_1 = tg\left(\frac{\pi}{2} - \theta_1\right) x_1 = ctg\,\theta_1\, x_1$$

$$y_1 - b = tg\left(\frac{\pi}{2} - \alpha_1\right) x_1 = ctg\,\alpha_1\, x_1$$

$$x_1\left(ctg\,\theta_1 - ctg\,\alpha_1\right) = b$$

$$x_1 \frac{\sin(\alpha_1 - \theta_1)}{\sin\alpha_1 \sin\theta_1} = b$$

$$x \frac{\sin\alpha_2}{\sin\alpha_1 \sin\theta_1} = b$$

$$\therefore \begin{cases} x_1 = b\,\dfrac{\sin\alpha_1 \sin\theta_1}{\sin\alpha_2} \\ y_1 = \dfrac{x_1}{\operatorname{tg}\theta_1} \end{cases}$$

ex: $\alpha_1 = 52.5°$ $\theta_1 = 1$
$\alpha_2 = 37.5°$
$x_1 = 1.69$
$y_1 = 6.49$

2/ $y_2 = \operatorname{ctg}(\theta_1+\theta_2)\, x_2 = \dfrac{x_2}{\operatorname{tg} 2\theta_1}$ $\quad \theta_1 = \theta_2$

$$\frac{y_2 - y_1}{x_2 - x_1} = \operatorname{tg}\left[\frac{\pi}{2} - (\theta_1 + \alpha_2 + \beta_1)\right]$$

$$= \operatorname{ctg}(\theta_1 + \alpha_2 + \beta_1)$$

$$\equiv \operatorname{ctg}(\theta_1 + \alpha_1 - \theta_1 + \beta_1) = \operatorname{ctg}(\alpha_1 + \beta_1)$$

$$y_2 - y_1 = \operatorname{ctg}(\alpha_1+\beta_1)(x_2 - x_1)$$

$$x_2\left[\operatorname{ctg} 2\theta_1 - \operatorname{ctg}(\alpha_1+\beta_1)\right] = y_1 - \operatorname{ctg}(\alpha_1+\beta_1)\, x_1$$

$$x_2\, \frac{\sin(\alpha_1+\beta_1-2\theta_1)}{\sin(\alpha_1+\beta_1)\sin 2\theta_1} = y_1 - \frac{x_1}{\operatorname{tg}(\alpha_1+\beta_1)}$$

$$x_2\, \frac{\sin\alpha_3}{\sin(\alpha_1+\beta_1)\sin 2\theta_1} = y_1 - \frac{x_1}{\operatorname{tg}(\alpha_1+\beta_1)}$$

$$\therefore \begin{cases} x_2 = \left(y_1 - \dfrac{x_1}{\operatorname{tg}(\alpha_1+\beta_1)}\right) \dfrac{\sin(\alpha_1+\beta_1)\sin 2\theta_1}{\sin\alpha_3} \\ y_2 = \dfrac{x_2}{\operatorname{tg} 2\theta_1} \end{cases}$$

$\theta_1 = 60°$

$x_2 = 4.6$
$y_2 = 7.97$

3/ $y_3 = ctg(3\theta_1)\, x_3$

$$\frac{y_3 - y_2}{x_3 - x_2} = ctg(\alpha_3 + \beta_2 + 2\theta_1)$$

$$= ctg(\alpha_1 + \beta - 2\theta + \beta_2 + 2\theta_1) = ctg(\alpha_1 + 2\beta_1$$

$$y_3 - y_2 = ctg(\alpha_1 + 2\beta_1)(x_3 - x_2)$$

$$x_3\left[ctg\,3\theta_1 - ctg(\alpha_1 + 2\beta_1)\right] = y_2 - \frac{x_2}{ctg(\alpha_1 + 2\beta_1)}$$

$$\therefore \begin{cases} x_3 = \left[y_2 - \dfrac{x_2}{ctg(\alpha_1 + 2\beta_1)}\right] \dfrac{\sin(\alpha_1 + 2\beta_1)\sin 3\theta_1}{\sin\alpha_4} \\ y_3 = \dfrac{x_3}{ctg\,3\theta_1} \end{cases}$$

$$\vdots$$

$$\begin{cases} x_i = \left[y_{i-1} - \dfrac{x_{i-1}}{ctg(\alpha_1 + (i-1)\beta)}\right] \dfrac{\sin[\alpha_1 + (i-1)\beta]\sin i\theta}{\sin\alpha_{i+1}} \\ y_i = \dfrac{x_i}{ctg\, i\theta_1} \end{cases}$$

If $\theta_1 = \theta_2 = \cdots = \theta$

$\beta_1 = \beta_2 = \cdots = \beta$

$\alpha_2 = \alpha_1 - \theta$

$\alpha_3 = (\alpha_2 + \beta) - \theta$

$= \alpha_1 + \beta - 2\theta$

$\alpha_4 = (\alpha_3 + \beta) - \theta$

$= \alpha_1 + 2\beta - 3\theta$

$\vdots$

$\alpha_i = \alpha_1 + (i-2)\beta - (i-1)\theta \qquad i \geq 2.$

also

$\alpha_1 = \left(\frac{\pi}{2} + \theta\right)/2$

$\beta = \frac{\theta}{2}.$

1 52.5°

2 37.5 + 7.5 = 45

3 30 + 7.5 = 37.5

4

52.5

+ 15

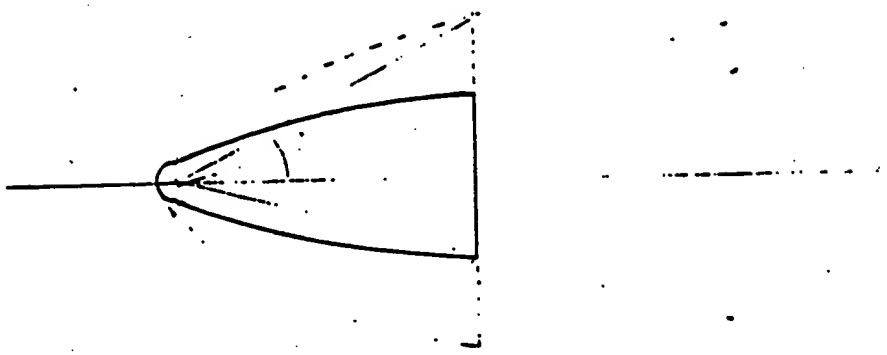
67

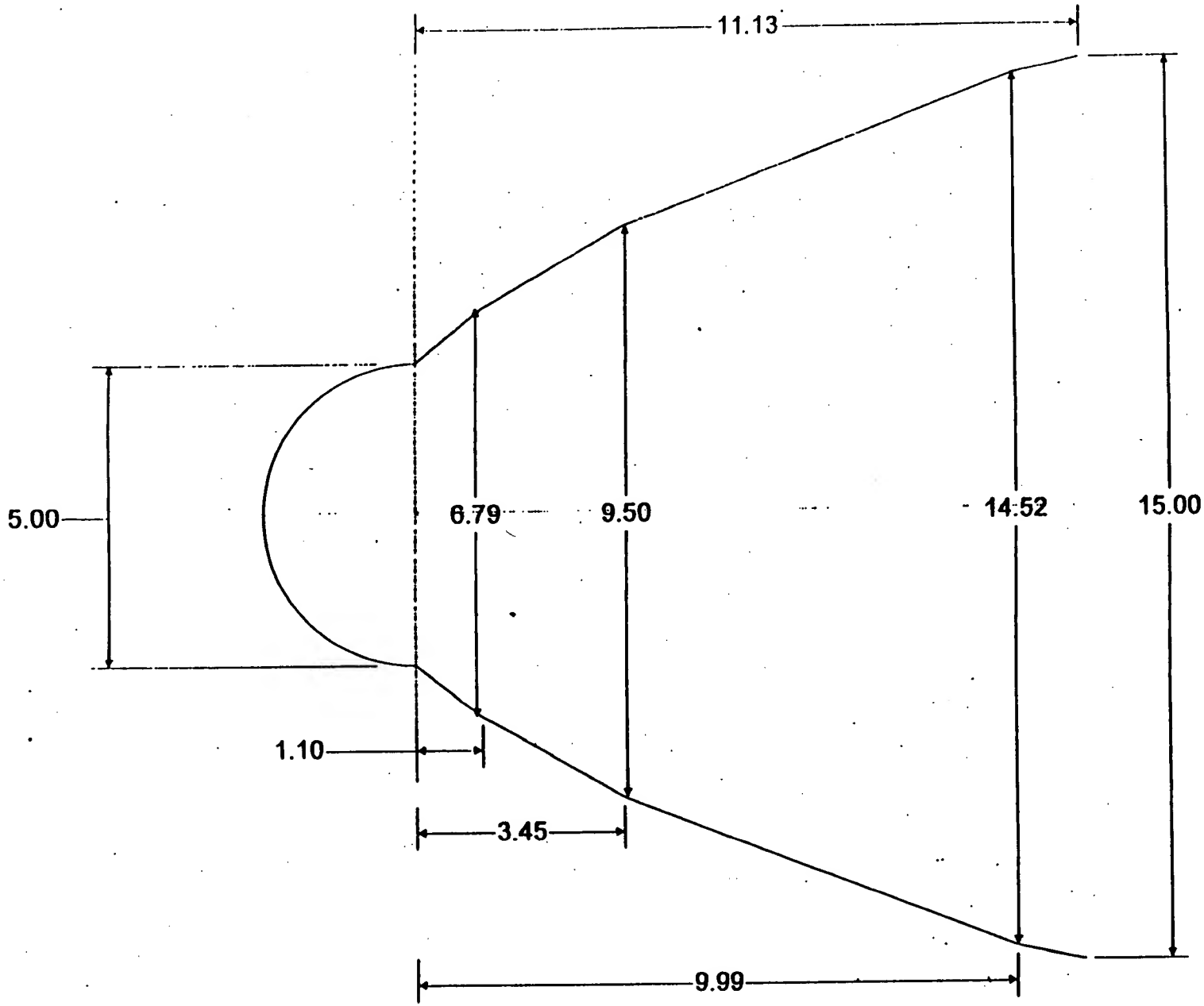
52.5000	0.8433	3.1470
37.5000	2.3038	3.9903
30.0000	5.1828	5.1828
22.5000	12.2627	7.0798
15.0000	40.0997	10.7446
7.5000	0.0000	0.0000

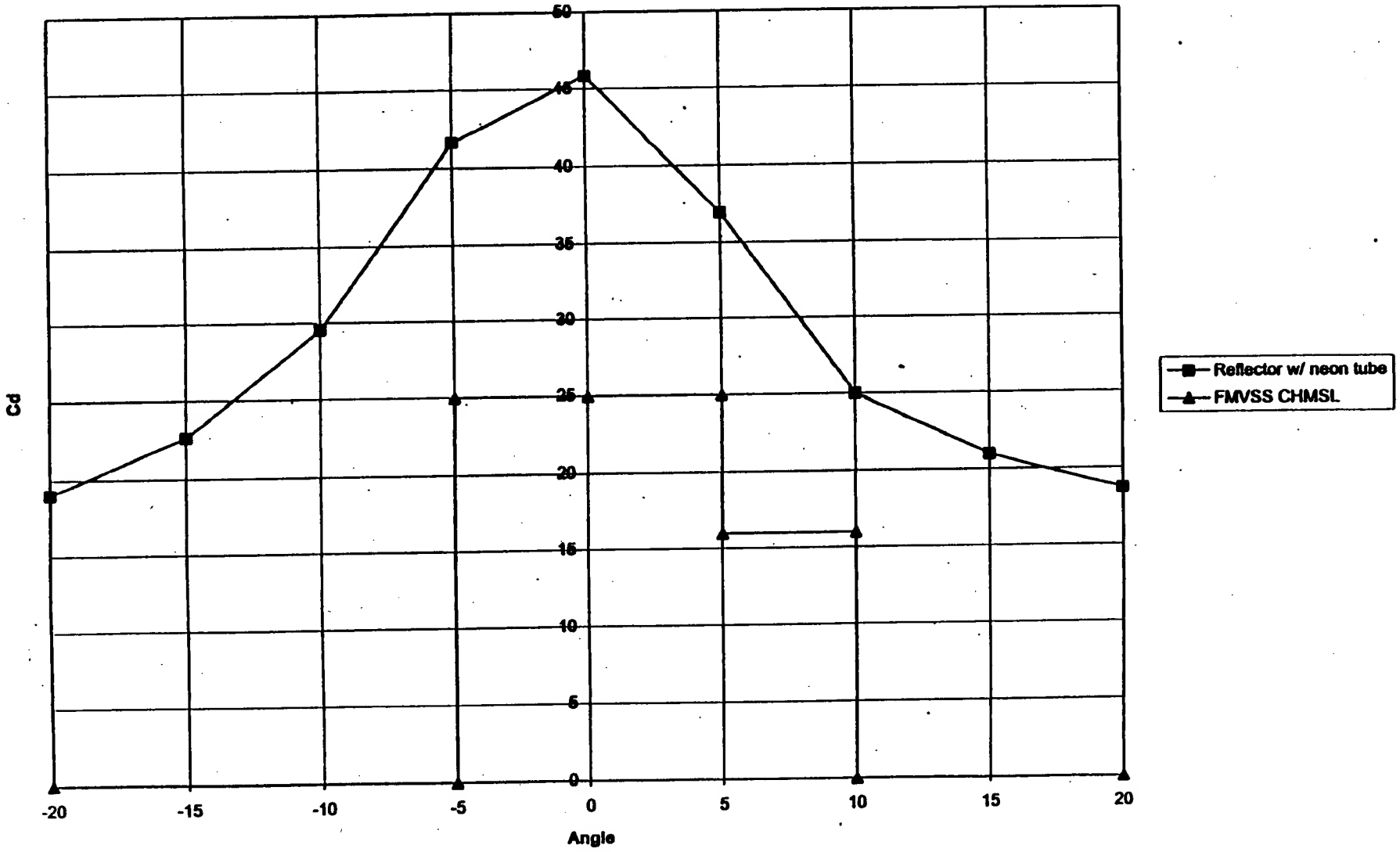
15° case

R = 2.5 mm for the light source tube

T = 10.7446 or D = 21.5 mm for the light p




11.13
5.00
6.79
9.50
14.52
15.00
1.10
3.45
9.99


Reflector and FMVSS Requirments for a CHMSL
Cd
50
45
40
35
30
25
20
15
10
5
0
-20
-15
-10
-5
0
5
10
15
20
Angle
Reflector w/ neon tube
FMVSS CHMSL